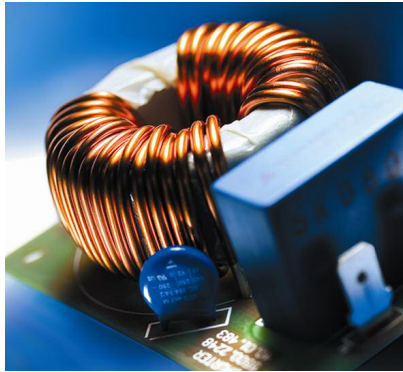




EMC Emissions in the Machine Industry



Technical lecture by Herbert Blum

> Programme

- > Basic Requirements
- > Applicable Standard EN55011:2009
- > Practical Examples

> Basic Requirements

European Directives

>The basic requirements for EMC are laid down in the European directives:

- Machines directive	2006/42/EG	Appendix 1
- Low voltage directive	2006/95/EG	Appendix 1
- EMC directive	2004/108/EG	Appendix 1
- Atex directive	94/9/EG	Appendix 2

> Basic Requirements

Machines Directive 2006/42

>Chapter 1.5.2 Static Electricity: Machines must be designed and manufactured in a manner such that any dangerous electrostatic discharges are avoided....

>Chapter 1.5.10 Radiation: Unwanted radiation emissions from a machine must be prevented or reduced to a level such that these have no harmful effects on human life.

>Chapter 1.5.11 External Radiation: Machines must be designed and manufactured in a manner such that their function is not impaired by external radiation.

> Basic Requirements

EMC Directive 2004/108/EC

>Chapter 1: Protection requirements

Equipment shall be so designed and manufactured, having regard to the state of the art, so as to ensure that:

a) the electromagnetic disturbance generated does not exceed the level above which radio and telecommunications equipment or other equipment cannot operate as intended; =>

Emission

b) it has a level of immunity to the electromagnetic disturbance to be expected in its intended use, which allows it to operate without unacceptable degradation of its intended use. =>

Immunity

> Basic Requirements

EMC Directive 2004/108/EC

>Article 13: Fixed installations

(2) Where there are indications of non-compliance of the fixed installation, in particular where there are complaints about disturbances being generated by the installation, the competent authorities of the Member State concerned may request evidence of compliance of the fixed installation and, when appropriate, initiate an assessment.

If it is ascertained that a fixed installation does not fulfil the requirements, the competent authorities can issue an injunction for the taking of suitable measures to ensure conformity with the protection requirements of Appendix 1 Chapter 1 (**Slide no. 5**).

> Basic Requirements

EMC Directive vs. Machines Directive

- > EMC is to be taken into consideration with the safety and security of machines.
- > EMC product requirements are legally binding and defined in the EMC directive.
- > EMC requirements can also be found in other directives, e.g., in the machines directive.

> Basic Requirements

Indices in the EMC Directive

- > (13) Harmonised standards reflect the generally acknowledged state of the art as regards electromagnetic compatibility matters in the European Union. It is thus in the interest of the functioning of the internal market to have standards for the electromagnetic compatibility of equipment which have been harmonised at Community level. **Once the reference to such a standard has been published in the Official Journal of the European Union, compliance with it should raise a presumption of conformity with the relevant essential requirements, although other means of demonstrating such conformity should be permitted. Compliance with a harmonised standard means conformity with its provisions and demonstration thereof by the methods the harmonised standard describes or refers to.**

> Basic Requirements Listing in the Official European Journal

(Publication des titres et des références des normes harmonisées au titre de la directive)

(2010/C 306/01)

OEN (*)	Référence et titre de la norme harmonisée (et document de référence)	Référence de la norme remplacée	Date de cessation de la présomption de conformité de la norme remplacée Note 1
CEN	EN 617:2001 Équipements et systèmes de manutention continue - Prescriptions de sécurité et de CEM pour les équipements de stockage des produits en vrac en silos, soutes, réservoirs et trémies		

the reference

> Basic Requirements Listing in the Official European Journal

Link to the EMC Standards in the Official European Journal:

http://ec.europa.eu/enterprise/policies/european-standards/documents/harmonised-standards-legislation/list-references/electromagnetic-compatibility/index_en.htm

Link to the Official European Journal (updated daily):

<http://eur-lex.europa.eu/de/index.htm>

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Aktuelles

ANSICHT

ERWEITERTE SUCHE
nach Dokument
nach Dokumentnummer
nach Datum
nach Fundstelle im ABL
nach CLEX-Nummer
weitere Optionen

ERWEITERTE SUCHE

SAMMLUNGEN
Verträge
Internationale Abkommen
Geführtes Gemeinschaftsrecht
Verordnungen

Auswahl neuer Dokumente

- 04/02/2011: 2011/77/EU: Durchführungsbeschluss des Rates vom 7. Dezember 2010 über einen finanziellen Beistand der Union für Irland* pdf
- 04/02/2011: Verordnung (EU) Nr. 90/2011 der Kommission vom 3. Februar 2011 mit Durchführungsbestimmungen für die Ausfuhrerlöse im Sektor Geflügelfleisch* pdf
- 02/02/2011: Durchführungsverordnung (EU) Nr. 14/2011 des Rates vom 31. Januar 2011 zur Änderung der Verordnung (EG) Nr. 765/2006 über restriktive Maßnahmen gegen Präsident Libchaberka und verschiedene belarussische Amtsträger* pdf
- 02/02/2011: Beschluss 2011/72/GASP des Rates vom 31. Januar 2011 über restriktive Maßnahmen gegen bestimmte Personen und Organisationen angesichts der Lage in Tunesien* pdf
- 31/01/2011: MITTEILUNG DER KOMMISSION AN DAS EUROPÄISCHE PARLAMENT, DEN RAT, DEN EUROPÄISCHEN WIRTSCHAFTS- UND SOZIALAUSSCHUSS UND DEN AUSSCHUSS DER REGIONEN Beauftragung des Schulabrucks – ein wichtiger Beitrag zur Agenda Europa 2020* html pdf

> Basic Requirements

Application of the Testing Standards

- >The manufacturer is responsible for knowing and applying the standards necessary for his system .
- >Should there be no product standards available for the conformity part, the following generic standards are to be used :

IEC61000-6-1	Domestic and business premises	Immunity
IEC61000-6-2	Industrial premises	Immunity
IEC61000-6-3	Domestic and business premises	Emission
IEC61000-6-4	Industrial premises	Emission

> Basic Requirements

Application of the Testing Standards

- >If a product standard exists, this should be used.
- >For emissions of fixtures and fittings in the machine industry, EN55011: 2009 is normally used.

IEC61000-6-1	Domestic and business premises	Immunity
IEC61000-6-2	Industrial premises	Immunity
IEC61000-6-3	Domestic and business premises	Emission EN55011:2009
IEC61000-6-4	Industrial premises	Emission EN55011:2009

> Applicable Standard EN55011:2009

Actual status

- > **Industrial, scientific and medical devices – radio disturbance – limiting values and measurement procedures (IEC/CISPR 11:2009, modified); German text EN 55011:2009**
- > The EN 55011:2009 has adopted the 5th edition of the International standard IEC/CISPR 11 (edition 2009) with common European modifications.
- > This European standard was adopted by CENELEC on 2009-09-01.





> Applicable Standard EN55011:2009

Description

- > The standard is valid for disturbance suppression of high frequency devices in industrial, scientific, medical and domestic applications, as well as for ISM*-HF applications in the frequency range of 150 kHz to 400 Ghz and specifies the required limiting values for this and the disturbance field strength, as well as the associated measuring procedure for measurement at at the testing laboratory or at the installation and operating location of the device to be measured. Measurements need only be carried out, however, for those frequencies for which the limiting values are also specified. Those devices and operating means that are covered by this standard (domestic or business premises) and dependent on the installation location, are subdivided into two classes A and B . Furthermore, and should the high frequency energy be needed for the treatment of materials and/or for the purpose of the examination, they will be placed in group 2. (Source: Beuth Publishers, www.beuth.de)

*ISM devices: Industrial, Scientific and Medical devices

> Applicable Standard EN55011:2009
Classification of ISM Devices

	Group 1 all other ISM devices	Group 2 ISM devices with HF effective energy 9kHz – 400GHz
Class A	<p>Industry Example: Machine tool controls</p> 	<p>Industry Example: El. Welding machines Erosion machines</p> 
Class B	<p>Domestic / office premises Example: Laboratory equipment Medical-scientific equipment</p> 	<p>Domestic / office premises Examples: Microwave devices Induction cookers Dielectric heaters Medical equipment with HF application</p> 

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> Applicable Standard EN55011
Measurement Setup Emission

- > Measurement of the disturbance voltage at the mains supply connection with a network simulation according to CISPR16.2 (150kHz – 30MHz)
- > Measurement of the disturbance radiation with an antenna at a distance of 3m or 10m (30MHz – 1GHz)



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> Practical Example
Test setup for mains borne emission

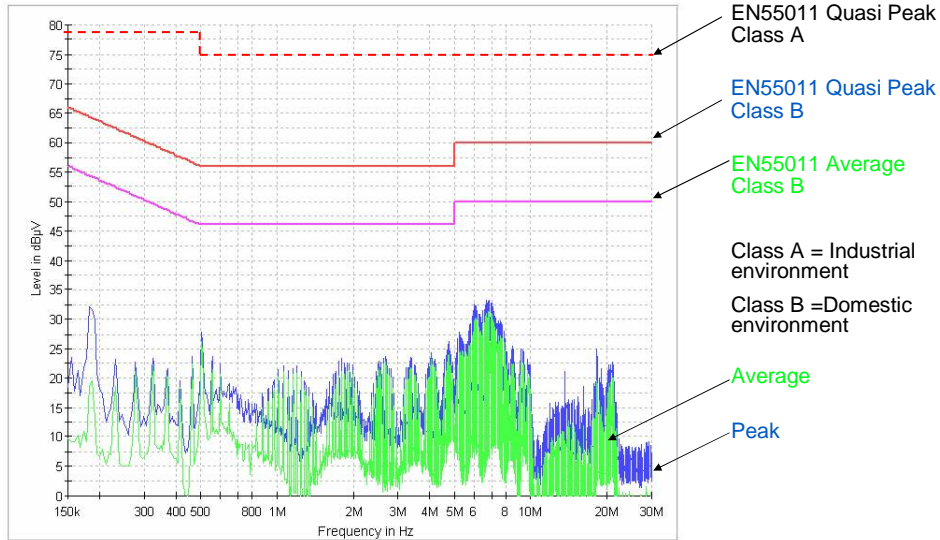


> Practical Example
Test setup for mains borne emission



> Practical Example 1

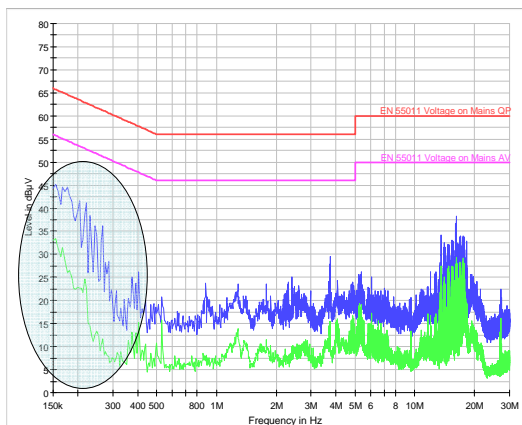
> Limiting values



> Practical Example

> Measurement of the base level in an industrial environment

Phase1

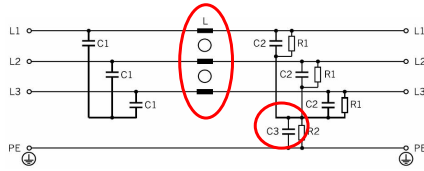


Peak
Average

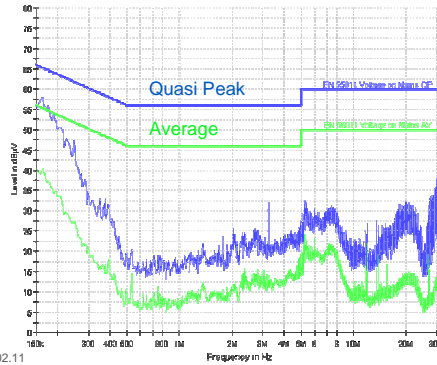
Despite the network simulation, the test system displays a high level of disturbance in the 150-200kHz range. The measurement should therefore be carried out in a testing chamber better suited for the purpose. The test setup is tested to limiting values class B.

> Practical Example

FMAC ECO (single stage)

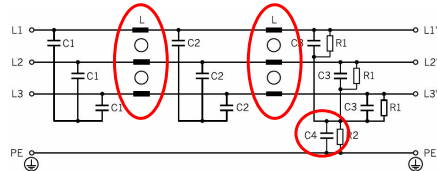


3 x 0.57 mH 3.3 μ F

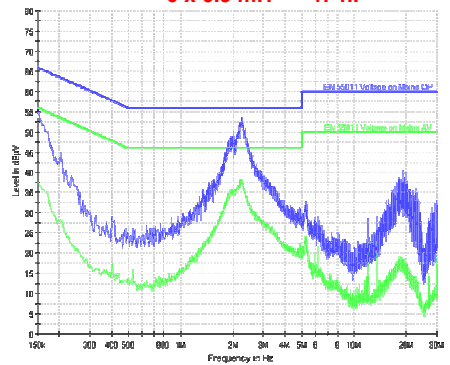


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FMBC ECO (two stage)



6 x 0.9 mH 47 nF



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> Where can SCHURTER support you



Mains borne emission



Immunity Surge/burst



Central testing laboratory in Lucerne



Radiated emission*



Immunity ESD



Mobile for testing on site

* = The measurements for radiated emission are carried out in an unshielded hall. The results lend themselves as reference value fixings during the development phase.

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